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DEADLOCK MONITORING

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(57) Claim

1. A lock assembly including, a housing, a lock bolt mounted on the housing for relative movement between a locking position and an unlocking position, deadlocking means movable between an operative condition and an inoperative condition at which it prevents and does not prevent respectively movement of said lock bolt into said unlocking position, and status response means which is responsive to a change in the condition of said deadlocking means so as to be thereby operable to actuate indicator means connected to said status response means.

15. A lock assembly including a housing, a lock bolt mounted on the housing for relative movement between a locking position and an unlocking position, actuator means which is operable to move said bolt from the locking position to the unlocking position, and detection means which is responsive to operation of said actuator means so as to be thereby operable to actuate signal means connected to said detection means.

19. A door lock system including a door movable between

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open and closed positions, a lock assembly mounted on said door, a lock bolt forming part of said assembly and being movable relative to said door between a locking position and an unlocking position, deadlocking means forming part of said assembly and being operative to prevent movement of said lock bolt from the locked position to the unlocked position, and a monitoring means which is responsive to changes in the position of said door and the condition of said deadlocking means so as to indicate whether said deadlocking means is operative while said door is in the closed position.

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Complete Specification for the invention entitled:

"DEADLOCK MONITORING"

The following statement is a full description of this invention, including the best method for performing it known to applicant(s):

DEADLOCK MONITORING

This invention relates to locks of the kind including a bolt which is movable between lock and unlock conditions. Such locks are commonly used to secure doors and the like in a closed position. It will be convenient to hereinafter describe the invention with particular reference to door locks, but it is to be understood that the invention has other uses.

There is a growing need for systems which can effectively monitor the condition of a door lock. It is known to connect a door lock into an electrical circuit which also includes means which is responsive to opening and closing of a switch associated with the lock so as to indicate the status of the lock. Prior to the present invention, such systems have not been satisfactory.

A critical part of the componentry of present day locks is the deadlocking mechanism which possibly holds the lock bolt against movement into a retracted or unlocking position. Previously known lock status systems have not satisfactorily monitored the condition of that mechanism, with the result that an incorrect or invalid indication of the status of the lock can arise.

Another problem arises with remote surveillance of the condition of a door and its associated lock, and that is the dependability of the information provided by the surveillance system. A common requirement is to be able to determine at a remote location whether the door is both closed and securely locked. Monitoring systems available to date have not been entirely trustworthy in that regard, because it has been possible to corrupt part of the system so that the indicator gives incorrect information concerning the status of the lock for example.

It is an object of the present invention to provide a lock of relatively simple form which can be connected into an electric powered monitoring system so as to provide reliable information concerning the status of the lock.

It is another object of the invention to provide improved means for monitoring the condition of a lock, and

the condition of the associated door, from a remote location.

Other objects and advantages of the invention will be apparent from the following detailed description of one particular form of lock which incorporates an embodiment of the invention.

In accordance with one aspect of the present invention, there is provided a lock assembly including, a housing, a lock bolt mounted on the housing for relative movement between a locking position and an unlocking position, deadlocking means movable between an operative condition and an inoperative condition at which it prevents and does not prevent respectively movement of said lock bolt into said unlocking position, and status response means which is responsive to a change in the condition of said deadlocking means so as to be thereby operable to actuate indicator means connected to said status response means.

In a preferred arrangement, the invention is applied to a solenoid controlled lock assembly. That is, a lock assembly in which a solenoid has influence on the position of a detent which, when in an active position, operates to prevent movement of the lock bolt to the unlocking position. The lock bolt may be a latchbolt or a deadbolt, and the detent may have direct or indirect influence on the lock bolt. In a typical lock assembly, the lock bolt undergoes linear movement between the lock active and lock release positions, and it will be convenient to hereinafter describe the invention with reference to such an assembly. The invention is also applicable to other types of lock assemblies including those in which the operative member (bolt, tongue, etc.,), undergoes rotational or pivotal movement.

The status response means may be a microswitch which is located within the lock assembly housing so as to be responsive to movement of a deadlocking lever, for example. In one form of lock system incorporating such a lock assembly, the switch is connected into an electrical circuit through another device which monitors the position

of a door or other member to which the lock assembly is connected. The arrangement is preferably such that a door secure condition is revealed by the indicator means only in circumstances where the deadlocking mechanism is operative while the door is closed.

According to a further aspect of the invention, there is provided a lock assembly including a housing, a lock bolt mounted on the housing for relative movement between a locking position and an unlocking position, actuator means which is operable to move the bolt from the locking position to the unlocking position, and detection means which is responsive to operation of the actuator means so as to be thereby operable to actuate signal means connected to the detection means.

It will be convenient to hereinafter describe the invention, according to its various aspects, by reference to a particular form of lock assembly including a linearly movable latchbolt and a deadlatching facility. Each aspect of the invention is applicable to other forms of lock assemblies. Also, the example assembly hereinafter described will be described as including each aspect of the invention, but only one of those aspects may be adopted in practice, or any two or more may be adopted according to particular requirements.

Embodiments of the invention are described in detail in the following passages of the specification which refer to the accompanying drawings. The drawings, however, are merely illustrative of how the invention might be put into effect, so that the specific form and arrangement of the various features as shown is not to be understood as limiting on the invention.

In the drawings:

Figure 1 is a semi-diagrammatic illustration of one form of latch assembly to which the invention is applicable and which is shown from the front edge, and the latch assembly is shown partially exploded for convenience of illustration.

Figure 2 is a view taken along line II-II ot Figure 1 and which shows the latch assembly with one side plate

removed so that internal components are visible, but in which some components have been omitted for convenience of illustration.

Figure 3 is a diagrammatic view of part of the assembly shown in Figure 2 and which shows the locking mechanism in the inactive position.

Figure 4 is a view similar to Figure 3 but showing the locking mechanism in the active position.

Figure 5 is a view similar to Figure 4 but showing the locking mechanism arranged so that the active position is adopted while the solenoid is de-energised.

Figure 6 is a view similar to Figure 5 but showing the locking mechanism in the inactive position.

Figure 7 is a semi-diagrammatic view of part of the assembly shown in Figure 1 and in which the deadlocking means is shown inoperative.

Figure 8 is a view similar to Figure 7 but showing the deadlocking means in an operative condition.

Figure 9 is a view similar to Figure 2 but with various parts omitted for convenience of illustration and in which part of an electric circuit is shown.

Figure 10 is a front elevation view of the assembly shown in Figure 9.

The latch assembly 1 shown diagrammatically in Figure 1, includes inner and outer handles 2 and 3 which are interconnected through a drive shaft 4, and which are operable to cause movement of a latchbolt 5 as hereinafter described. In some forms of the assembly 1, the drive shaft 4 may be split into two separate components so that the handles 2 and 3 are independently operable. A cylinder lock 6 is operable by a key from the outside of the assembly 1 so as to influence locking mechanism as hereinafter described which acts on the latchbolt 5, and a turn knob 7 may have corresponding influence from the inside of the assembly 1.

The assembly 1 is, in general terms, a typical latch assembly of the kind commonly used with swinging doors, and as previously stated is not the only form of assembly to which the invention is applicable. The following

description of the assembly 1 assumes that the reader has a working knowledge of latch assemblies of the kind shown.

As best seen in Figure 2, the latch bolt 5 is mounted on a housing 8 so as to be movable longitudinally between the latched position, which is shown in Figure 2, and an unlatched position at which the head 9 of the bolt 5 is at least substantially contained within the housing 8. A biasing spring (not shown) normally urges the bolt 5 towards the latched position. Retraction of the bolt 5 is effected through a rotatable actuator 10 which is non rotatably mounted on the drive shaft 4, and is rotated as required through manipulation of the handles 2 and 3. The drive shaft 4 is not shown in Figure 2, but in use that shaft is received in the bore 10a of square cross-sectional shape which extends through the actuator 10.

A deadlatching lever 11 of known form is pivotally mounted on the bolt 5 and is engageable with a stop plate 12 so as to prevent retraction of the bolt 5. The lever 11 swings about a pivot 13 between an operative position, as shown in Figure 2, and an inoperative position at which it is not engageable with the stop plate 12. Rotation of the actuator 10 in the direction of arrow A causes the lever 11 to be moved into the inoperative position, in a known manner. Operation of either the cylinder lock 6 or the turn knob 7 can have the same result, and again the means for achieving that is known.

Locking mechanism 14 of a preferred form is shown in Figures 2 to 6 of the drawings. That mechanism 14 includes a detent in the form of a bar 15, and control means 16 connected to the bar 15 and arranged to control operation of that bar 15. In the particular arrangement shown, the control means 16 includes an electrically operable solenoid 17 and a biasing spring 18. The solenoid 17 includes a coil body 19 and a shaft 20 which is axially movable within the body 19. The coil is energised by connection to a source of electrical current and thereby generates magnetic flux which influences the shaft 20 to move in one direction. When the coil is

de-energised, the spring 18 operates to move the shaft 20 in the reverse direction.

The control means 16 may be used in either a fail safe arrangement, or a fail secure arrangement, according to requirements. Figures 2 to 4 show the former arrangement, and Figures 5 and 6 show the latter. In each arrangement, the detent bar 15 is mounted within the housing 8 for relative sliding movement between an active position as shown in Figures 2, 4 and 5, and an inactive position as shown in Figures 3 and 6. In the particular form of the detent bar 15 as shown, that bar has a head 21 and a tail 22 which are connected through a plate section 23. Other forms of detent bar are clearly available.

Referring to the fail safe arrangement of Figures 2 to 4, the coil body 19 is secured to the housing 8 against relative movement and is disposed between the bar head 21 and tail 22. The solenoid shaft 20 is attached to the bar 15 at or adjacent the tail 22, and any suitable means may be used for that purpose. In the arrangement shown, that attaching means is formed by a pin 24 which is slidable within a hole formed in the bar tail 22. The biasing spring 18 is disposed between the pin 24 and the end 25 of the coil body 19, and is arranged to urge the shaft 20 out of the body 19. A reverse arrangement is possible.

Stop means may be provided to limit the degree of relative movement between the coil body 19 and the shaft 20. In the arrangement shown, that stop means includes a recess 26 formed in the bar plate section 23. Shoulders 27 and 28 formed at respective ends of the recess 26 are engageable with respective ends 25 and 29 of the coil body 19 so as to define the limits of the aforementioned relative movement.

The solenoid 17 is connectible to a source of electrical current through conductor wires 30. When current is connected to the coil, the shaft 20 is drawn into the coil body 19 as shown in Figure 4, and thereby activates the mechanism 14. In the absence of such a connection, the spring 18 operates to pull the shaft 20 out of the body 19.

When the mechanism 14 is activated, the bar head 21 is operative to prevent operation of the actuator 10 such as to cause unlatching movement of the bolt 5. In the arrangement shown, that is achieved by placement of the head 21 adjacent an abutment surface 31 of the actuator 10 (Figure 4). When the mechanism 14 is de-activated, the bar head 21 is lifted clear of the abutment surface 31 so that the actuator 10 can be rotated as required.

It is a feature of the mechanism 14 as described, that it is usable with minimum modification in each of the arrangements of Figures 2 to 4 and Figures 5 and 6, respectively. In order to adapt the mechanism 14 to the latter arrangement, it is only necessary to reverse the disposition of the coil body 19 so that the shaft 20 projects downwards rather than upwards as in the arrangement of Figures 2 to 4. Holes 32 and 33 formed at opposite end portions of the bar 15 enable the two alternative attachments between that bar and the shaft 20. That is, either hole 32 or 33 can receive the pin 24. The only other change which may be required is that a relatively weak spring 18 may be satisfactory in the Figures 5 and 6 arrangement, whereas in the arrangement of Figures 2 to 4 the spring 18 needs to be of sufficient strength to be able to lift the bar 15.

The particular latch assembly 1 shown in Figure 2 includes status response means 34 which is operative to indicate or cause an indication of the status of the lock assembly 1. The status response means 34 may take any suitable form, but in the example shown includes a microswitch 35 secured to the housing 8, and a switch actuator in the form of a bar 36 slidably mounted on the housing 8. The switch bar 36 is responsive to change of position of the deadlatching lever 11 as shown in Figures 7 and 8. When the lever 11 is in the inoperative position as shown in Figure 7, the switch 35 is in an open circuit condition. Movement of the lever 11 to the operative position (Figure 8) causes the bar 36 to be lifted so as to operate the switch 35, and in particular move the switch to the closed circuit condition. The switch 35 is

preferably arranged to automatically adopt the open circuit condition when the bar 36 eventually moves back to the Figure 7 position.

It is preferred that the condition of the switch 35 is observable at a control room or other remote station from which the operation of the lock assembly 1, and the associated door, may be monitored. For that purpose, the switch 35 is connectable into a circuit which includes appropriate indicator means. The indicator means operates to reveal the condition of the switch 35, and may be of the visible and/or audible kind. In a preferred arrangement, the indicator means is positioned remote from the lock assembly 1.

It is a feature of the arrangement shown that the status response means 34 can be readily adapted for use with either inwardly or outwardly opening doors. Figure 2 shows the status response means 34 associated with one hand of door, whereas Figure 7 and 8 show the status response means 34 associated with an opposite hand of door. In Figure 2, the deadlatching lever 11 swings downwards to adopt the operative condition, whereas it swings upwards in the Figures 7 and 8 arrangement. The status response means 34 is conditioned for either hand of operation by simply reversing the terminals through which the switch 35 is connected into the associated circuitry. Also, in the Figure 2 arrangement, the bar 36 engages edge 40 of the lever 11, whereas it engages the opposite edge 39 in the Figures 7 and 8 arrangement.

In the particular arrangement shown diagrammatically in Figures 9 and 10, the condition of the locking mechanism 14, and particularly the solenoid 17, is revealed by a visible indicator which is observable to a person approaching the door with which the assembly 1 is associated. Such an indicator may comprise a light emitting diode 38, or other form of indicator light, mounted on or in association with the housing 8 so as to be visible at the outside, for example, of the aforementioned door. If desired, a light 38 may be provided on both the inside and the outside of the door.

The light 38 is connected by conductor wires 37 to the solenoid 17, or to means which is responsive to the status of the solenoid 17. In operation, the light 38 may be energised when the locking mechanism 14 is in the locked condition, and de-energised when the mechanism 14 is in the unlocked condition.

The condition of the associated door - i.e., open or closed - may be also detected by condition response means 41 (Figure 2). In the arrangement shown, that response means 41 includes a magnet 42 secured to the frame 43 which surrounds the opening controlled by the door with which the lock assembly 1 is used, and a reed switch 44 or similar device attached to the housing 8. Other arrangements may be adopted for the same purpose.

When the door is closed the reed switch 44 responds to its resulting close proximity to the magnet 42 by adopting a particular condition. The switch 44 adopts another condition when moved away from the magnet 42 as a consequence of the associated door being opened. The change in condition of the switch 44 may be detected in any appropriate manner. Preferably, that switch 44 is connected into a circuit such as to cooperate with the status response means 34 in such a way that a "secure" signal is generated at the control room or other remote location only if the two conditions are satisfied. That is, the "secure" signal indicates that the door is closed and the deadlatching lever 11 is in its operative condition. The individual condition of each of the switches 35 and 44 may be observable or otherwise detectable at the control room or other remote station referred to, but in that event it is nevertheless preferred that a correct status or "secure" signal is detectable at that room or station only if the two relevant conditions are satisfied at the one time. That is, the lock assembly 1 is deadlatched and the associated door is closed.

In some circumstances, it may be desirable to monitor operation of the lock assembly 1 from the inside - i.e., by use of the inner handle 2 or the turn knob 7.

Detection means may be provided for that purpose, and such detection means may or may not be used with the mechanism 14, or the response means 34 and 41, as previously described. Figures 2 and 9 show one form of detection means 45, and other forms of detection means may be adopted.

The detection means 45 includes a microswitch 46, or similar device, fixed to the housing 8, and a switch bar 47 mounted on a housing 8 for movement relative thereto. A switch operator in the form of a bar 47 is arranged to respond to movement of the actuator 10, and biasing means (not shown) may operate to normally urge the bar 47 into the position shown in Figures 2 and 9. In that position, the switch 46 is conditioned to indicate no change in the condition of the lock assembly 1. The switch 46 is connected into appropriate circuitry through conductor wires 48.

When the actuator 10 is turned to move the latchbolt 5 to the unlatched position, a finger 49 attached to the actuator 10 pushes against the bar 47 to move it to the left of the position shown in Figures 2 and 9. As a result of that movement, the bar 47 engages the switch 46 and causes a change in the condition of that switch, which is reflected through the aforementioned circuitry. Indicator or signal means at a remote location may be part of that circuitry. The indicator or signal means may be of the visible and/or audible kind. In one arrangement the indicator or signal means includes or comprises an alarm system, and that system is activated or de-activated according to the condition of the switch 46.

Detection means of the foregoing kind is particularly suited for use with a lock assembly in which there is a split drive between the actuator 10 and the two handles 2 and 3. That is, the inner handle 2 may be operated to rotate the actuator 10 while the mechanism 14 holds the outer handle 3 against corresponding movement.

A key override facility may be incorporated in the lock assembly 1. In the particular arrangement shown, that facility includes a microswitch 50, or similar

device, which is responsive to operation of the cylinder lock 6. That is, a member 51 (Figure 1) attached to the barrel lock 6 is operable to strike and actuate the switch 50 when the lock 6 is operated by a key. Actuation of the switch 50 may have any desired result. For example, it may result in de-activation of an alarm system associated with the lock assembly 1 and/or the door on which the assembly 1 is mounted. Actuation of the switch 50 may be also recorded permanently or temporarily at the aforementioned control room or other remote station. Operation of the lock 6 is also effective to retract the bolt 5, and that is achieved in a known manner.

In a preferred arrangement as shown in Figures 2 and 9, each of the switches 35, 44, 46 and 50, and the light emitting diode 38, are connected to a multi-pin socket 52 attached to the rear edge of the housing 8. That enables convenient attachment of the lock assembly 1 into appropriate circuitry by means of a plug (not shown) associated with that circuitry. Separation of the assembly 1 from the circuitry can be achieved with equal convenience. Obviously, the positions of the socket and the plug could be reversed so that the plug is attached to the housing 8 and the socket is part of the connectable circuit.

Each of the switches 35, 46 and 50, may be attached to an appropriate circuit board (not shown) which is mounted within the housing 8.

It will be apparent from the foregoing description that each of the various aspects of the invention provides a significant improvement over prior remote controlled locks. Use of two or more of those aspects in a lock assembly results in a particularly unique and effective assembly. The various control features are achieved with minimum expense and without significant disturbance to the general arrangement of standard mechanical components. It is particularly advantageous that switch conductor wires can be accommodated within the lock assembly housing so as to be protected from damage.

Various alterations, modifications and/or additions

may be introduced into the constructions and arrangements of parts previously described without departing from the spirit or ambit of the invention as defined by the appended claims.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A lock assembly including, a housing, a lock bolt mounted on the housing for relative movement between a locking position and an unlocking position, deadlocking means movable between an operative condition and an inoperative condition at which it prevents and does not prevent respectively movement of said lock bolt into said unlocking position, and status response means which is responsive to a change in the condition of said deadlocking means so as to be thereby operable to actuate indicator means connected to said status response means.

2. A lock assembly according to claim 1, wherein said status response means includes a deadlock switch which is located within said housing and is operable to open and close an electric circuit, and said circuit is connectable to said switch and includes said indicator means.

3. A lock assembly according to claim 2, wherein said deadlocking means includes a lever which is movable about a pivot axis to adopt said operative and inoperative conditions, and said switch is responsive to pivotal movement of said lever so as to open or close said circuit according to whether said lever adopts one of said conditions or the other.

4. A lock assembly according to claim 3, wherein said switch responds to said lever movement through the intermediary of a switch actuator which coacts with both said lever and said switch and is mounted on said housing for movement relative thereto.

5. A lock assembly according to claim 4, wherein said switch actuator includes a bar slidably mounted within said housing and which engages said lever and said switch at respective opposite ends thereof.

6. A lock assembly according to any one of claims 2 to 5, wherein door position monitoring means is mounted on said housing, and said switch is connected to said monitoring means so as to be connectable into said circuit through said monitoring means.

7. A lock assembly according to any preceding claim, including locking mechanism having a detent which is

movable between active and inactive positions at which it prevents and does not prevent respectively movement of said lock bolt from the locking position to the unlocking position, and detent control means having electrically operated drive means which is operable to control movement of said detent between said two positions thereof.

8. A lock assembly according to claim 7, wherein said drive means includes a solenoid which is connected between said housing and said detent.

9. A lock assembly according to any one of claims 1 to 6, including locking mechanism which is operable to prevent movement of said lock bolt from the locking position to the unlocking position, and a solenoid connected to said locking mechanism and being operable to control operation of said mechanism.

10. A lock assembly according to any preceding claim, including actuator means which is operable to move said bolt from the locking position to the unlocking position, and detection means which is responsive to operation of said actuator means so as to be thereby operable to actuate signal means connected to said detection means.

11. A lock assembly according to claim 10, wherein said detection means includes a switch which is operable to open and close an electric circuit and a switch operator which is responsive to operation of said actuator means, and said circuit is connectable to said switch and includes said signal means.

12. A lock assembly according to claim 10 or 11, wherein said actuator means includes an actuator rotatably mounted on said housing and arranged to cause said bolt to move from the locking position to the unlocking position thereof when the actuator is rotated in one direction, and said detection means is responsive to rotation of said actuator is said one direction.

13. A lock assembly according to any preceding claim, including key operated means which is operable to move said lock bolt from the locking position to the unlocking position, and switch means responsive to said operation of the key operated means to make or break an electrical

circuit connected to said switch means.

14. A lock assembly according to any one of claims 1 to 9, including actuator means which is operable to move said lock bolt from the locking position to the unlocking position, key operated means which is operable to prevent use of said actuator to move said lock bolt from the locking position to the unlocking position, and switch means responsive to said operation of the key operated means to thereby influence operation of an alarm system connected to said switch means.

15. A lock assembly including a housing, a lock bolt mounted on the housing for relative movement between a locking position and an unlocking position, actuator means which is operable to move said bolt from the locking position to the unlocking position, and detection means which is responsive to operation of said actuator means so as to be thereby operable to actuate signal means connected to said detection means.

16. A lock system including, a lock assembly according to any one of claims 1 to 6 and 9, wherein said circuit is connected to said switch and said indicator means is at a location remote from said lock assembly.

17. A lock system including, a door movable between open and closed positions, a lock assembly according to claim 6 mounted on said door, said monitoring means includes a door switch which is responsive to changes in the position of said door has a particular condition when said door is in said closed position, and said deadlock and door switches are interconnected and operable to cause said indicator means to generate a door secure signal if said deadlocking means is operative while said door is in the closed position.

18. A lock system according to claim 17, wherein said lock assembly includes locking mechanism which is operable to prevent movement of said lock bolt from the locking position to the unlocking position, and a solenoid which is connected to said locking mechanism and is operable to control operation of said mechanism.

19. A door lock system including a door movable between

open and closed positions, a lock assembly mounted on said door, a lock bolt forming part of said assembly and being movable relative to said door between a locking position and an unlocking position, deadlocking means forming part of said assembly and being operative to prevent movement of said lock bolt from the locked position to the unlocked position, and a monitoring means which is responsive to changes in the position of said door and the condition of said deadlocking means so as to indicate whether said deadlocking means is operative while said door is in the closed position.

20. A lock system according to claim 19, wherein said monitoring means includes a first switch which is responsive to changes in the position of said door and a second switch which is responsive to operation of said deadlocking means, each of said switches being operable to open and close an electric circuit which includes signal means, and said signal means is responsive to the condition of said switches so as to provide a visible and/or audible indication of whether or not said door is both closed and securely locked.

21. A lock assembly substantially as herein particularly described with reference to any one of the embodiments shown in the accompanying drawings.

DATED: 16 December 1994

PHILLIPS ORMONDE & FITZPATRICK
Attorneys for:
LOCKWOOD AUSTRALIA PTY. LTD.

David B Fitzpatrick

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A B S T R A C T

A lock assembly for use with doors and the like and which has a lock bolt mounted on a housing for movement between locking and unlocking positions. A rotatable actuator connected to a door knob or handle is operable to cause the lock bolt to move from the locking position to the unlocking position. Solenoid controlled locking mechanism is arranged to prevent movement of the lock bolt into the unlocking position and is adapted to be mounted on the housing in either of two positions. In one of those positions the mechanism operates to prevent the lock bolt movement while the solenoid is energised, whereas in the other position the mechanism so operates while the solenoid is de-energised. The lock assembly also includes switch means which is responsive to changes in the condition of deadlocking means forming part of the assembly, and which is operative to open and close an electric circuit. Such switch means may be also responsive to changes in the position of an associated door. The assembly may further include additional switch means which is responsive to movement of the rotatable actuator. Still further switch means is responsive to operation of a key operated lock forming part of the lock assembly.

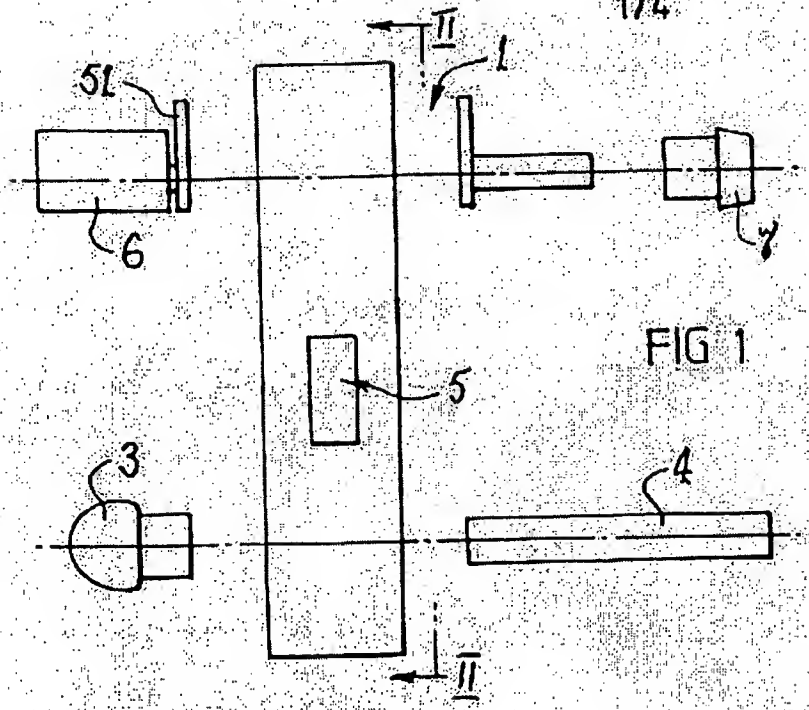

FIG 1

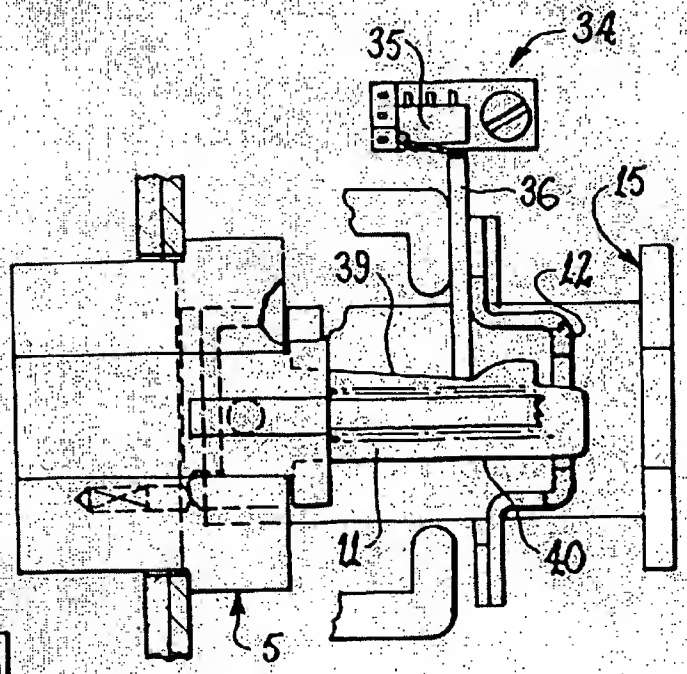

FIG 7

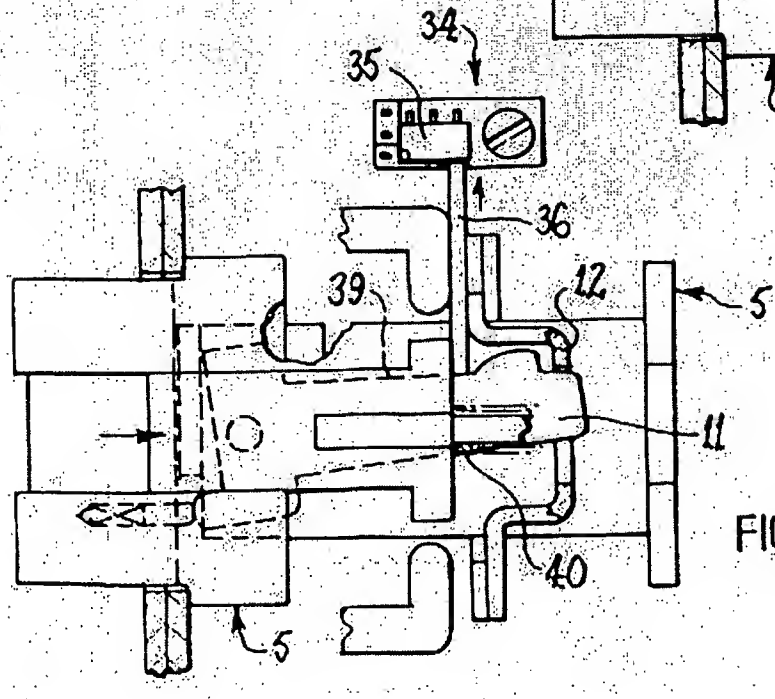

FIG 8

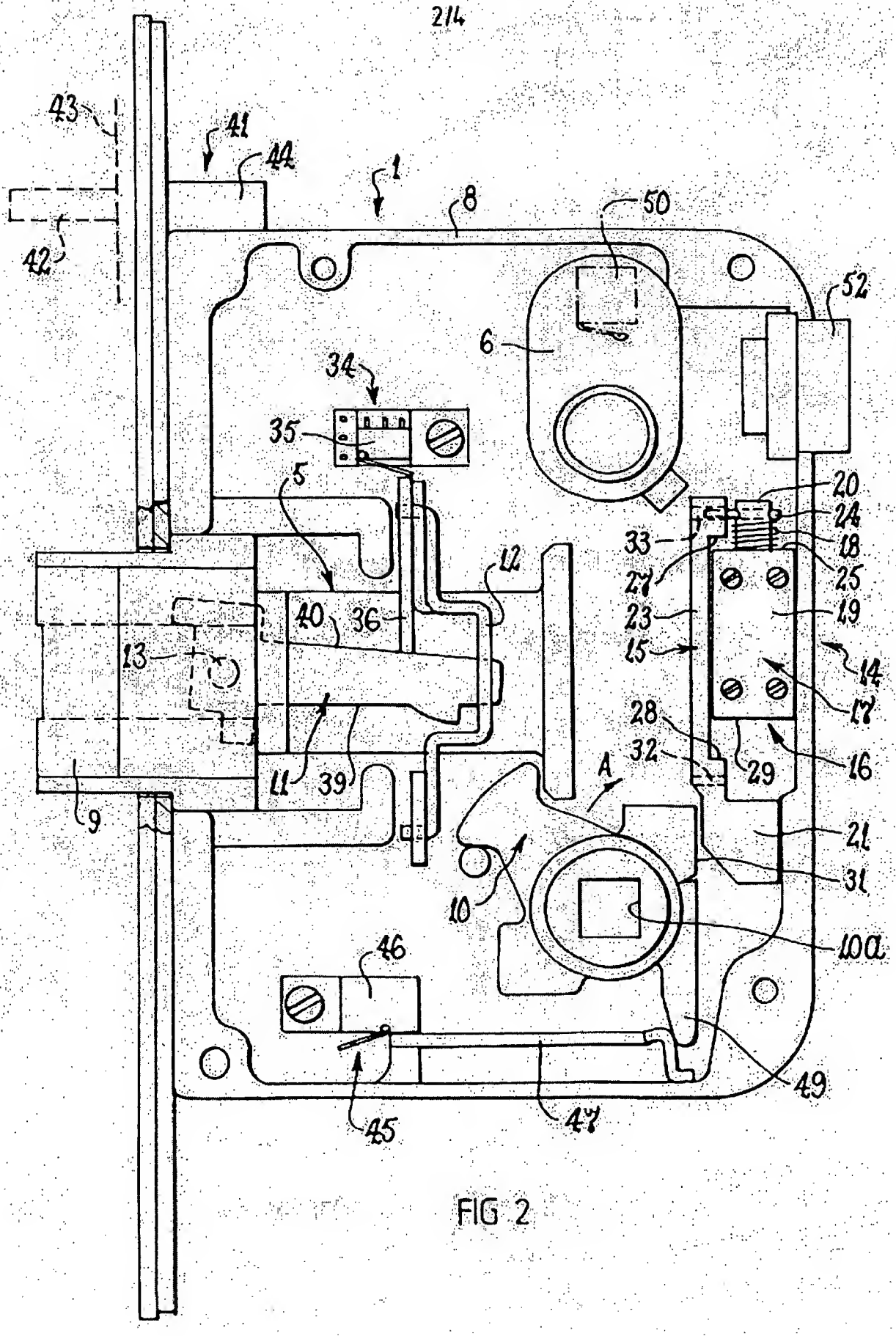
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FIG 2

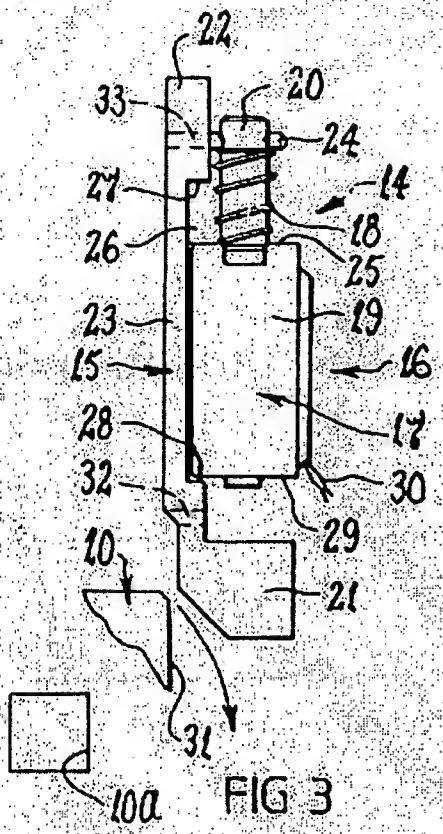

FIG 3

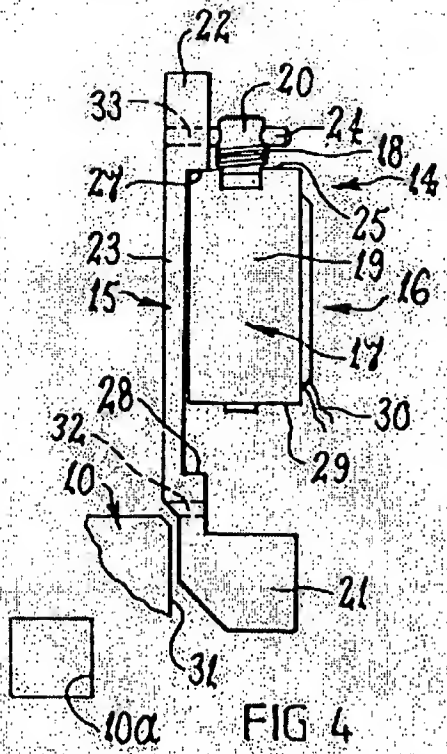

FIG 4

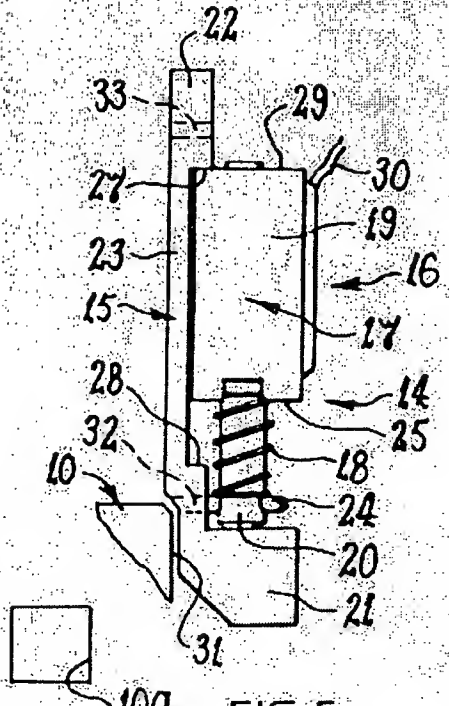

FIG 5

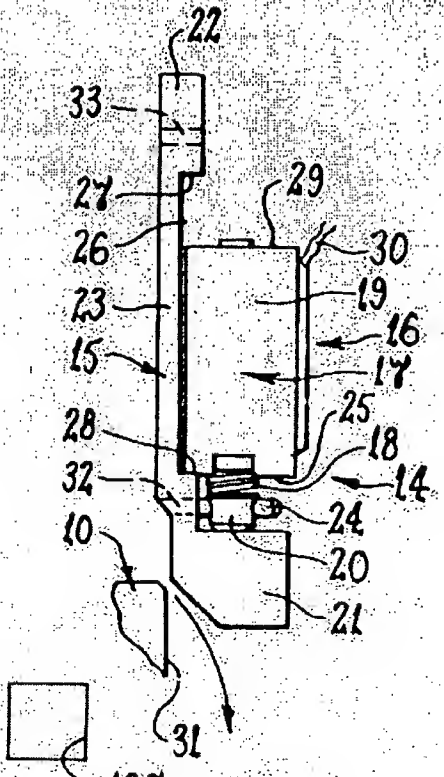

FIG 6

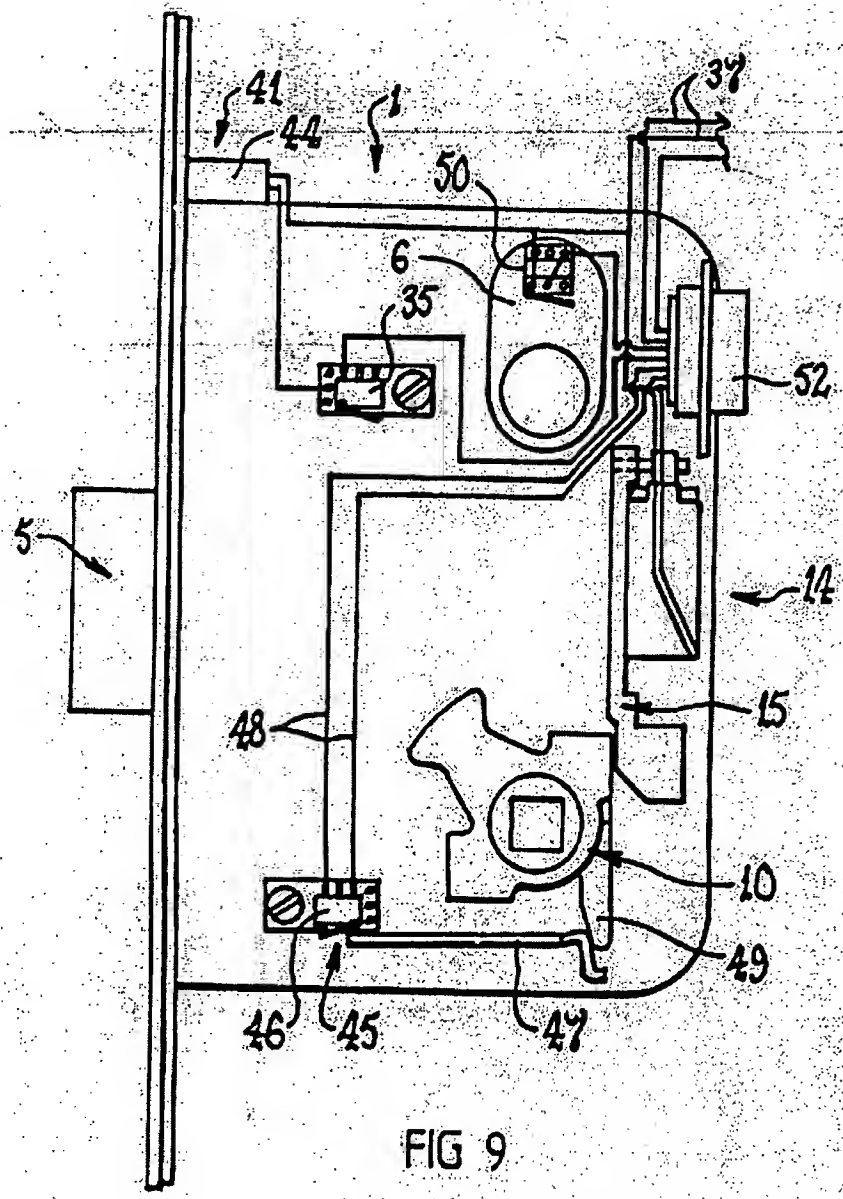

FIG 9

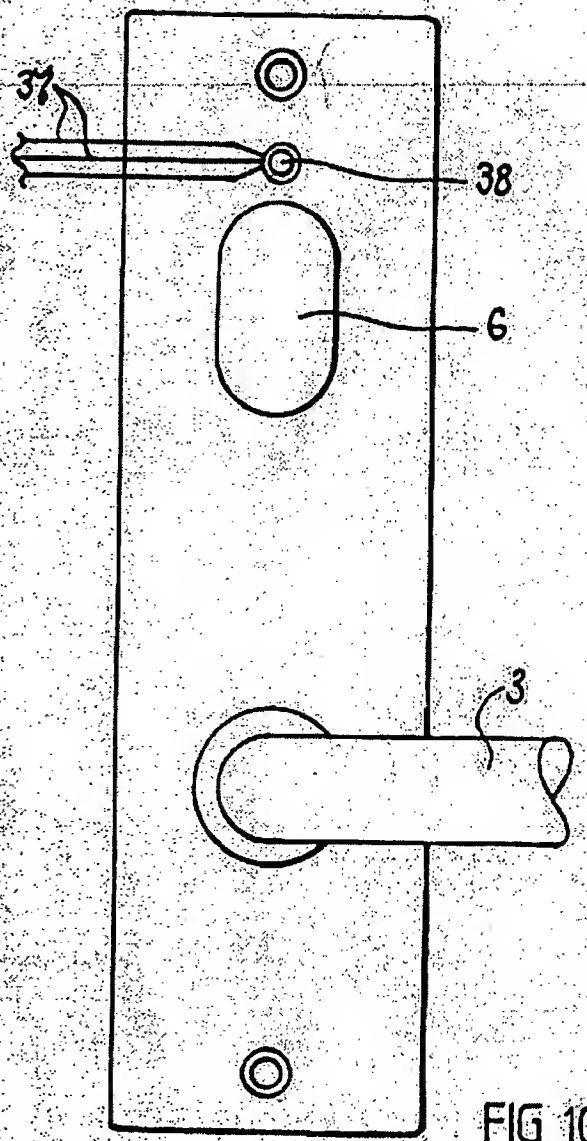

FIG 10